Grading Permit No. 4714 #357

PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING
SOIL EXPLORATION REPORT

KILAUEA AVENUE, HONOLULU, HAWAII
TAX MAP KEY: 3-5-17: 35 to 39

To:
MR. JAMES TSUGAWA

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DECEMBER 18, 1970

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

January 21, 1971

MR. JAMES TSUGAWA
Penthouse 1232 Waimanu Street
Honolulu, Hawaii 96814

Dear Mr. Tsugawa:

Subject: Addendum to Soil Exploration Report
Dated December 18, 1970
Proposed 50-Unit Condominium Apartment Building
Kilauea Avenue, Honolulu, Oahu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

Since our soil exploration report of December 18, 1970, the site plan has been further developed.

This letter should serve as an addendum to our soil report and includes our comments regarding the latest grading plan.

Because lava rock will probably occur near the present ground surface for more than a third of the site, some blasting will probably be required for the foundation excavation. The excavation and blasting should be done with care because of the close proximity of the existing apartment buildings and swimming pool. The consulting architect and engineers should be included in the contractor's general liability insurance to save the consultants harmless in case a claim should arise from his construction or blasting activities.

Regarding cut slopes in rock behind the proposed structure, the rock slopes may be cut at slope ratios of 3/4 horizontal to 1 vertical. In cases where only boulders and clay deposits are found, the boulders and clay slopes may have to be adjusted out in the field.

Footing foundations should bear on the bedrock where practicable. In some instances, the clay and cinder pockets may be relatively deep. In these cases, adjustments in footing depths should be made out in the field as these conditions are encountered.

Adobe soils under floor slabs and beams should be removed or kept at least 2 ft below the bottoms of the concrete floor slabs or grade beams.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

Ezra Koike

Ezra Koike
Professional Engineer
Hawaii No. 1450

EK:rmf

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

December 18, 1970

MR. JAMES TSUGAWA
Penthouse 1232 Waimanu Street
Honolulu, Hawaii 96814

Dear Mr. Tsugawa:

Subject: Proposed 50-Unit Condominium Apartment Building
Soil Exploration Report
(for foundation design purposes)
Kilauea Avenue, Honolulu, Oahu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

Transmitted herewith is our soil exploration report for foundation design purposes for the proposed 50-Unit Condominium Apartment Building on Kilauea Avenue, Honolulu, Oahu, Hawaii.

The soil conditions at the site may be generally described as surface soils of brown clay and boulders underlain by lava rock and clinker. The rock profile under the building varies. The clay cover also varies from little to 4 ft or more.

Spread footing foundations extending below the surface clays are recommended.

This report includes a Boring Location Plan, boring logs, laboratory test results, recommendations and limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

Ezra Koike

Ezra Koike
Professional Engineer
Hawaii No. 1450

EK:rmf

C O N T E N T S

PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING
SOIL EXPLORATION REPORT

KILAUEA AVENUE, HONOLULU, HAWAII
TAX MAP KEY: 3-5-17: 35 to 39

SCOPE OF EXPLORATION

The purpose of this exploration was to determine general soil conditions for foundation design for the proposed 4-story, 50-Unit Condominium Apartment Building on Kilauea Avenue, Honolulu, Oahu, Hawaii.

This report includes field exploration, laboratory tests and general recommendations for building foundation design.

FIELD EXPLORATION AND LABORATORY TESTS

Five exploratory borings were made at the site at the locations shown on the Boring Location Plan.

Borings were made with 3-in. diameter augers using drag bits and rotary coring using carbide and diamond bits. Soil samples were recovered with a 2-in. o.d. standard split spoon sampler driven with a 140-lb hammer falling 30 inches. Rock samples were recovered with "AX", "BX" and "NX" core barrels.

In addition, three 14-in. diameter auger holes (Boring Nos. 6, 7 & 8) were made along the northern section of the proposed parking area and driveway.

Laboratory tests included: natural water content and Atterberg limit tests.

SOIL CLASSIFICATION SYSTEM

Soil samples were visually observed and subjected to appropriate tests in the laboratory. Based on visual observations and laboratory tests, the soil descriptions given in the boring logs are generally made in accordance with the "Unified Soil Classification System."

GENERAL SITE CONDITIONS

The site of the proposed apartment building is located about 400 ft west of Kilauea Avenue and north of Waialae Garden Apartments.

The site is a rocky hillside sloping down to the southeast at about a 5 to 50% gradient.

Lava rock is exposed in a cut slope below the southeast corner of the site.

The borings are generally located on a berm about 10 to 20 ft wide extending along the side of the hill. Ground cover consisted of grass, kiawe and haole koa. An overhead power line runs nearly parallel to the proposed building on the uphill portion of the proposed building site.

INTERPRETATION OF SOIL CONDITIONS

From the field explorations, the soils at the site may be generally described as follows:

A surface layer of about 1 to 4 ft or more of brown clay and boulders underlain by lava rock with clinker pockets and vent spaces to about 31 ft, the maximum depth drilled in Boring No. 3A.

Water was not noted in the borings during the field explorations.

For more detailed descriptions of soils encountered in the drill holes, refer to the boring logs.

DISCUSSION

The building site is located along the lower slope of a lava flow.

The proposed plan is to construct a 4-story apartment building with a basement about 280 ft by 30 ft in plan, and a paved parking area.

The makai portion of the building will be about elevation 126 ft for the first floor without a basement. The mauka portion will be about elevation 118 ft for the first floor and 109 ft for the basement floor.

The rock profile under the building will vary considerably.

For foundation purposes, the ideal design would be to rest all of the footings on solid rock. This may not always be practicable. Some differential settlements may arise when the underlying formation consists partly of rock and partly of unconsolidated materials.

Adobe surface soils on a hillside will cause considerable trouble to structures constructed on these soils. If practicable, the 1 to 4 ft or more of adobe should be stripped before placing any fill over these soils.

RECOMMENDATIONS

General Site Grading

Clearing and grubbing are essential. Surface layers of adobe soils should be stripped from the sidehill areas.

Fills should be constructed in approximately level layers starting at the lower end and working upward.

Fills should be laid in 6-in. compacted layers with a relative density of at least 90% of AASHO T-180-57 density.

Fill material may be approved on-site or borrow soils. If practicable, fill material imported to the site should be select soils with a plasticity index generally less than 22.

The on-site adobe may be mixed with the rock from the excavation provided that the adobe is generally less than 15% of the rock-soil mixture.

Slopes

In general, cut and fill slopes of 2 horizontal to 1 vertical or flatter should be used.

For low cuts thru mixtures of decomposed rock and clinkers, slope ratios of 1 horizontal to 1 vertical or flatter may be used.

If slope heights of greater than 15 ft are considered, 8-ft-wide benches should be placed at height intervals of about 15 ft in both cuts and fills.

If rock fall from the existing slope above the site is considered a problem, an 8 to 10-ft wide ditch for a rock fallout zone may be constructed at the top of the proposed cut slopes. A rock wall should be constructed on the downhill side of the ditch. The base of the rock wall should extend down to bedrock.

For protection against erosion of fill slopes, the runoff from rainstorms should be diverted by berms or ditches away from slopes whenever practicable.

In general, slope planting is recommended on fill slopes to minimize erosion.

Building Foundations

In general, spread footing foundations are recommended.

For footings on cinders and decomposed rock, bearing values of 4000 p.s.f. may be used.

For footings on rock, bearing values of 8000 p.s.f. may be used.

If voids are suspected under a footing, a drill hole should be made to a depth of about 6 ft. The drill hole should then be grouted with sand-cement grout. Similarly, if clinker pockets are suspected to be loose and of great depth, drill holes should be made under each footing and grouted with neat cement grout.

Stiff Grade Beams

Stiff grade beams between columns are desirable to minimize differential settlements between columns. A stiff grade beam around the perimeter of the building is recommended.

To minimize the effects of cracks because of differential settlements, expansion joints should be provided between abrupt changes in structural configurations, and between joints of retaining walls.

Slabs on Ground

Slabs on ground should be placed after the superstructure is constructed and should be separated from grade beams, walls and columns.

For slabs on ground, a base course of 4 in. of well-graded gravel less than 3/4-in. and greater than 1/4-in. in size is recommended. The subgrade should be compacted and shaped to a level surface or to drain if practicable.

Retaining Walls

Retaining walls at the site should be constructed with bases that extend to bedrock.

Select materials should be used for constructing fills behind retaining walls.

Lateral earth pressures equivalent to at-rest conditions or equivalent fluid pressures of 40 p.c.f. may be used. Allowances should be made for lateral pressures generated by vehicular traffic.

Backfill behind retaining walls should be done with small compaction equipment.

Driveways and Parking Areas

In general, the pavement thickness in the proposed driveways and parking areas may be as follows:

1. Wearing course - 2-in. asphaltic concrete.
2. Base course - 6-in. base course.
3. Subbase -12-in. select material CBR > 25, over a prepared subgrade.

A leveling course of only about 2 in. in lieu of a 6-in. base course may be required on lava outcrop subgrade.

Subgrades should be compacted and shaped to drain. Outlets should be provided at low points of the paved areas to avoid water pocketing at the subgrade level. Where catch basins are placed in low areas, weep holes should be placed at subgrade levels through the walls of the catch basins.

Unforeseen Conditions

Unforeseen or undetected conditions such as soft spots or seepage water may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

BORING LOGS

Symbols

Symbols used generally are in accordance with the Unified Soil Classification System.

Where a parenthesis "(MH)" is used, the soil sample was classified by visual observation of the sample recovered.

Where no parenthesis "MH" is used, the soil sample was classified from either the Atterberg limits or sieve analysis test results.

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii

Tax Map Key: 3-5-17: 35 to 39

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON
"BX" - BX CORE BARREL
"AX" - AX CORE BARREL

BORING NO. 1 Sheet No. ____ of ____

Driller: WALTER LUM ASSOC. Date: DEC. 2, 3, 4 & 7, 1970

Field Party: GLORY, KAKU

Type of Boring: AUGER & (CONCORE AS JR) CORING Diam.: 3"

Elev.: 120' ± * Datum: —

Drill Bit: T.C. DRAG, T.C. & DIAMOND CORING

Water Level	NOT NOTICED				
Time	—				
Date	12-7-70				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 120' ± *	0								
	BROWN, CLAY w/ LAVA ROCK & COBBLES									
	MOTTLED LAVENDER & GRAY LAVA ROCK NOTE: SOME LOSS OF WATER AT 4.0'	5	"BX" 2"SS "BX"	1-A 1-B 1-C	CORED - 3.0' RECOV. - 1.5' - - CORED - 3.4' RECOV. - 3.0'	-	-	-	-	30/.1' HAMMER BOUNCES
	BX CORE BARREL w/ T.C. CORING BIT LAVA ROCK NOTE: LOST WATER AT 9.5' REDDISH-BROWN LAVA ROCK W/ CLINKER POCKETS	10	"BX"	1-D	CORED - 5.0' RECOV. - 2.0'					
	AX CORE BARREL w/ DIAMOND BIT LAVA ROCK W/FRACTURES	15	"AX" "AX"	1-E 1-F	CORED - 3.0' RECOV. - 2.5' CORED - 2.5' RECOV - 2.0'					
	END OF CORING @ 20.5'	20		1-G	CORED - 2.5' RECOV. - 2.5'					

* ELEVATION ESTIMATED FROM CONTOUR PLAN

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

HAMMER:
Weight 140#
Drop 30"

SAMPLER: 2" ss - 2" STANDARD SPLIT SPOON
"BX" - BX CORE BARREL
"AX" - AX CORE BARREL

BORING NO. 2 Sheet No. ____ of ____
Driller WALTER LUM ASSOC. Date DEC. 7, 8, 1970
Field Party GLORY, KAKU
Type of Boring AUGER / ROTARY (CONCORE A5-JR) Diam. 3"
Elev. 118'± * Datum ____
Drill Bit T.C. DRAG, T.C. & DIAMOND CORING

Water Level	NOT NOTICED				
Time	-				
Date	12-8-70				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 118'± *	0								
(CH)	BROWN, CLAY W/ ROOTS		2"ss	2-A		13				60/.3' HAMMER BOUNCES
	DENSE, MOTTLED BROWN, SILTY SAND & DEC. ROCK									
	MOTTLED, REDDISH-BROWN SILTY SAND W/ CLAY									
	BROWN, SILTY CLAY W/ TRACE OF SAND & COBBLES	5	2"ss	2-B	NO RECOVERY					35/.1' HAMMER BOUNCES
	BROWN, SILTY CLAY & COBBLES OR BOULDER		"BX"	2-C	CORED - 4.4' RECOV. - 3.5'					
	NOTE: LOSS OF WATER AT 9.5'	10								
	BX CORE BARREL W/ T.C. CORING BIT		"BX"	2-D	CORED - 8.0' RECOV. - 4.5'					
	LAVA ROCK W/ LAMINATED VENT SPACINGS	15								
		20	"BX"	2-E	CORED - 2.5' RECOV. - 2.5'					
	AX CORE BARREL W/ DIAMOND BIT		"AX"	2-F	CORED - 8.0' RECOV. - 3.7'					
	END OF CORING @ 28.5'									

* ELEVATION ESTIMATED FROM CONTOUR PLAN

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 3 Sheet No. ____ of ____

Driller: WALTER LUM ASSOC. Date: DEC. 8, 1970

Field Party: GLORY, KAKU

Type of Boring: AUGER (CONCORE AB JR.) Diam.: 2½"

Elev.: 112' ± * Datum: —

Drill Bit: T. C. DRAG

Water Level					
Time	—				
Date	12-8-70				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 112' ± *	0								
CH	BROWN, CLAY W/COBBLES & TRACES OF GRAVEL			3-A	25	33	67	-	-	12/.5' → 23/.5' HAMMER BOUNCES
	BOULDER OR ROCK	5		3-B	NO RECOVERY					31/.0' HAMMER BOUNCES
	END OF BORING @ 5'									
	NOTE: MOVED BORING 1' ± AWAY.									

* ELEVATION ESTIMATED FROM CONTOUR PLAN

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

HAMMER:
Weight
Drop

SAMPLER: NX CORE BARREL

BORING NO. 3A Sheet No. ____ of ____

Driller WALTER LUM ASSOC. Date DEC. 8 & 9, 1970

Field Party GLORY, KAKU

Type of Boring ROTARY (CONCORE A5 JR) Diam. 2½"

Elev. 112'± * Datum

Drill Bit T.C. CORING

Water Level					
	NOT NOTICED				
Time					
Date	12-9-70				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 112'± 7 *	0								
(CH)	BROWN, CLAY W/ COBBLES & GRAVEL									
	LAVA ROCK W/ FRACTURES & VENT SPACINGS	5		3A-A	CORED - 5.0'		RECOV. - 4.5'			
	NOTE: LOSS OF WATER AT 6'									
	NOTE: WATER RETURNED AT 9.5'	10		3A-B	CORED - 5.0'		RECOV. - 4.5'			
				3A-C	CORED - 5.0		RECOV. - 4.8'			
	NOTE: LOSS OF WATER AT 14'	15								
	MOTTLED LAVENDER & TAN, LAVA ROCK W/ VENT SPACINGS	20		3A-D	CORED - 5.0'		RECOV. - 2.4'			
				3A-E	CORED - 5.0'		RECOV. - 2.3'			
		25								
				3A-F	CORED - 5.0'					
		30			NOTE: NOT RECOVERED LOST BARREL					
	END OF CORING @ 31'									
	* ELEVATION ESTIMATED FROM CONTOUR PLAN									

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2" SS- 2" STANDARD SPLIT SPOON
"AX" - AX CORE BARREL

BORING NO. 4 Sheet No. ____ of ____
Driller: WALTER LUM ASSOC. Date: DEC. 10 & 11, 1970
Field Party: GLORY, KAKU
Type of Boring: ROTARY AUGER & (CONCORE) (AS JR) Diam.: 3"
Elev.: 107'± * Datum: ____
Drill Bit: T.C. DRAG & T.C. CORING

Water Level	NOT NOTICED				
Time	–				
Date	12-11-70				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 107'±7 *	0								
(CH)	STIFF, BROWN, CLAY W/TRACES OF ORG. MATTER		2"SS	4-A	–	36	–	–	–	G/1.5'
	MOTTLED TAN & GRAY, DECOMPOSED ROCK					28				24/.5'
	MOTTLED BROWN, SILTY SAND & DECOMPOSED ROCK	5	2"SS	4-B	–	–	–	–	–	31/.1'
	COBBLE OR BOULDER									
	MOTTLED BROWN, SILTY SAND & DECOMPOSED ROCK									
	COBBLE OR BOULDER									
	DENSE, MOTTLED BROWN & TAN, SILTY SAND & DECOMPOSED ROCK	10	2"SS	4-C	–	18	–	–	–	20/.3'
		15	2"SS	4-D	–	–	–	–	–	36/.1' HAMMER BOUNCES
	LAVA ROCK		2"SS	4-E	–	–	–	–	–	30/.0' HAMMER BOUNCES
	AX CORE BARREL W/T.C. CORING BIT	20	"AX"	4-F	CORED - RECOV. -		1.5' 1.0'			
			"AX"	4-G	CORED - RECOV. -		5.0' 2.2'			
	END OF BORING @ 25.5'	25								

* ELEVATION ESTIMATED FROM CONTOUR PLAN

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii
Tax Map Key: 3-5-17: 35 to 39

HAMMER:
Weight 140#
Drop 30"

SAMPLER: 2"ss - 2" STANDARD SPLIT SPOON
"BX" - BX CORE BARREL
"AX" - AX CORE BARREL

BORING NO. 5 Sheet No. _____ of _____
Driller WALTER LUM ASSOC. Date DEC. 11 & 12, 1970
Field Party GLORY, KAKU
Type of Boring AUGER & CORING (CONCORE AS JR) Diam. 3"
Elev. 102' ± * Datum _____
Drill Bit T.C. DRAG, T.C. & DIAMOND CORING

Water Level	NOT NOTICED				
Time	—				
Date	12-12-70				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40
	ELEV. = 102'± *	0								
(CH)	STIFF, BROWN, CLAY W/ GRAVEL, COBBLES OR BOULDERS & TRACES OF WHITE SAND		2"ss	S-A	-	25	-	-	-	
	LAVA ROCK	5	2"ss	S-B	-	-	-	-	-	30/1' HAMMER BOUNCES
	T.C. CORING BIT — VENT SPACE		2"ss	S-C	-	-	-	-	-	30/1' HAMMER BOUNCES
	BROWN & GRAY, LAVA ROCK	10	"BX"	S-D	CORED - RECOV. -	2.5' 2.4				
	DIAMOND BIT		"BX"	S-E	CORED - RECOV. -	0.7' 0.7'				
	END OF BORING @ 16'	15	"AX"	S-F	CORED - RECOV. -	4.3' 2.0'				
		20								

* ELEVATION ESTIMATED FROM CONTOUR PLAN

WALTER LUM ASSOCIATES

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: PROPOSED 50-UNIT CONDOMINIUM APARTMENT BUILDING

LOCATION: Kilauea Avenue, Honolulu, Hawaii

Tax Map Key: 3-5-17: 35 to 39

HAMMER:

Weight

Drop

SAMPLER:

BORING NO. 6,7 & 8 Sheet No. ____ of ____

Driller WALTER LUM ASSOC. Date DEC. 15, 1970

Field Party SUZUKI, MAKAULA

Type of Boring AUGER (MOBILE B-40) Diam. 14"

Elev. ____ Datum —

Drill Bit

Water Level	NOT NOTICED				
Time	—				
Date	12-15-70				

Unified Soil Classification	DRILLER'S DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	BORING NO. 6 ELEV. = 106' ± *	0								
	BROWN, CLAY & COBBLES									
	GRAY, SILTY SAND (DECOMPOSED ROCK) W/ COBBLES & BOULDERS	5								
	END OF BORING @ 6.5'									
	BORING NO. 7 ELEV. = 100' ± *	0								
	BROWN, CLAY W/ SAND									
	LAVA ROCK OR BOULDER									
	END OF BORING @ 2'									
	BORING NO. 8 ELEV. = 91' ± *	0								
	BROWN, CLAY W/SOME SAND									
	LAVA ROCK OR BOULDER									
	END OF BORING @ 3'									

* ELEVATION ESTIMATED FROM CONTOUR PLAN

PROPOSED 50-UNIT CONDOMINIUM

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	3		4	
SAMPLE NO.	A		A (TOP)	
DEPTH BELOW SURFACE	0.5'-2'		0.5'-2'	
DESCRIPTION	BROWN CLAY W/COBBLES & GRAVEL		DARK BROWN CLAY W/TRACES OF ROOTS	
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL		NATURAL	
Liquid Limit	67		82	
Plastic Limit	25		25	
Plasticity Index	42		57	
Dilatancy	NONE		NONE-SLOW	
Toughness	HIGH		MED-HIGH	
Dry Strength	HIGH		HIGH	
UNIFIED SOIL CLASSIFICATION	CH		CH	
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-57 Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

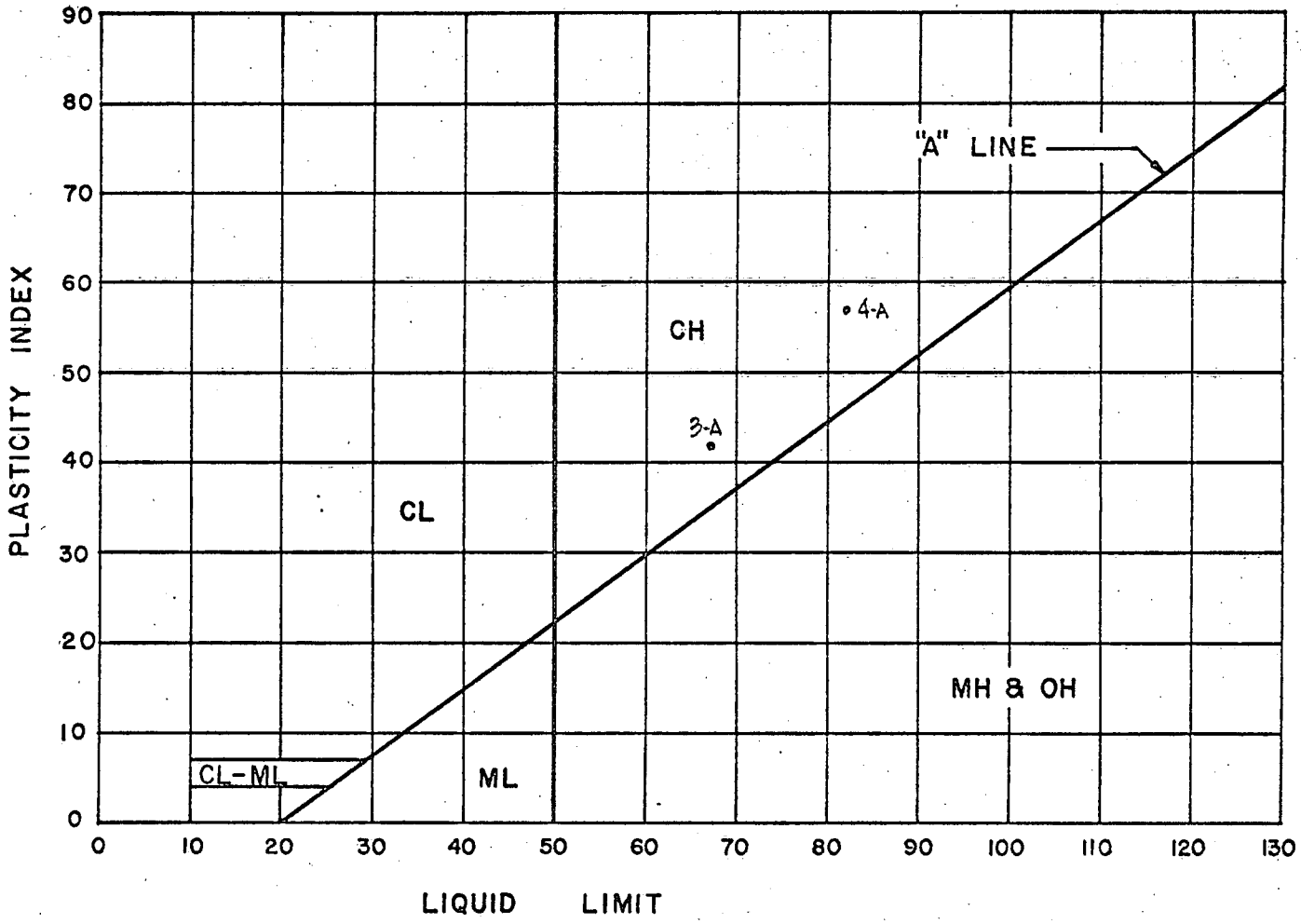
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 12-15-70 By D.T.

PLASTICITY CHART

PROJECT: PROPOSED 50-UNIT CONDOMINIUM

LOCATION: WAIALAE, HONOLULU, OAHU, HAWAII



DATE 12-15-70 BY B.T

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The boring logs indicate the approximate subsurface soil conditions encountered only at the drill holes where the borings were made at the times designated on the logs and may not represent conditions at other locations or at other dates. Soil conditions and water levels may change with the passage of time and construction methods or improvements at the site.

During construction, should subsurface conditions much different from those in the borings be observed, encountered, or otherwise indicated, we should be advised immediately to review or reconsider our recommendations in light of the new developments.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.

B-7

B-8

B-5

EXISTING SWIMMING POOL

WAIALAE APARTMENTS

EXISTING GARDEN

KILAUEA AVENUE

HUNAKAI ST. EXTENSION

LEGEND:

- BORING 3" DIA.
- BORING 14" DIA.

BORING LOCATION PLAN
PROPOSED 50 UNIT CONDOMINIUM APARTMENT BUILDING
KILAUEA AVENUE, HONOLULU, OAHU, HAWAII
TAX MAP KEY: 3-5-17: 35 TO 39

Dr. _____
Date _____
Rev. _____

WALTER LUM ASSOCIATES, INC.
3030 WAIALAE AVE.
CIVIL ENGINEERS
PHONE 737-7931

Sheet
of